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NAVFAC **IGS-02741 (SEPTEMBER 2002)**

Supercedes IGS-02741 (05/02)

Preparing Activity: LANTNAVFACENGCOM **Based on UFGS-02741N**

ITALIAN GUIDE SPECIFICATIONS

Use for ITALIAN projects only

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SECTION 02741

BITUMINOUS CONCRETE PAVEMENT
09/02

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NOTE: This guide specification is issued by the Atlantic Division, Naval Facilities Engineering Command for regional use in Italy.

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NOTE: This guide specification covers the requirements for asphaltic concrete paving for vehicular traffic and should not be used for airfield paving.

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NOTE: The designer shall verify that the application of the regional and local specification is indeed appropriate for the facility being designed or constructed. The following information shall be shown on the project drawings:

1. Plan with dimensions of the various types of paving.

2. Typical cross sections indicating dimensions of components of various types of paving, shoulders, and ditches, if any.

3. Joints between new and existing paving and between different types of paving.

4. A longitudinal profile of paving. Transverse profile will be shown in typical cross section.

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Comments and suggestion on this specification are welcome and should be directed to the technical proponent of the specification. A listing of the

technical proponents, **including their organization designation and telephone number, is on the Internet.**

Use of electronic communication is encouraged.

Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.

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PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AUTOSTRADE (HIGHWAY) - CONCESSION AND CONSTRUCTION OF HIGHWAYS (CCH)

CCH	(1992) Technical Specifications

NATIONAL RESEARCH COUNCIL (CNR)

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NOTE: The C.N.R. (National Research Council) is an organization that issues technical standards, norms, and technical specifications, together with certifications, tests, and crediting for Public Administrations at their request. The C.N.R. also provides for the compilation of norms for the acceptance, testing and unification of materials, instrucments, equipment, machinnery and various accessories for scientific and technical use, execution of norms, testing and protection of systems and constrruction. C.N.R. norms are available only in the Italian language. "B.U." is the abbreviation for "Official Bulletin."

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CNR BU 30	(1973) Determination of stability and flow for mixtures of mineral aggregates and bituminous material using Marshall equipment
CNR BU 38	(1973) Determination and bitumen content for mixtures of mineral aggregates and bitumen
CNR BU 39	(1973) Determination of void percentage for mixtures of mineral aggregates and bituminous material

CNR BU 65	(1978) Determination of percentage of voids in aggregate - Index of voids
CNR BU n. 68	(1978) Acceptance Criteria for Bitumen used in Road Constructions - Minimum Property Requirements for Acceptance
CNR BU 76	(1980) Determination of the apparent specific gravity of compacted mineral aggregate
CNR BU n. 81	(1980) Acceptance Criteria for Bitumen used in Road Constructions - Minimum Property Requirements for Acceptance
CNR BU n. 139	(1992) Acceptance Criteria for Aggregates Used for Road Constructions

ITALIAN/EUROPEAN HARMONIZATION STANDARDS (UNI EN)(UNI ENV)

UNI EN 1317-1	Road restraint systems - Terminology and general criteria for test methods
UNI EN 1317-2	Road restraint systems - Perforance classes, impact test acceptance criteria and test methods for safety barriers
UNI EN 1436	Road marking materials - Road moarking performance for road users
UNI EN 1824	Road marking materials - Road trials
UNI ENV 13459-2	Road marking materials - Quality control - Guidelines for preparing quality plans for materials application
UNI ENV 13459-3	Road marking materials - Quality control - Performance in use

ITALIAN LAWS AND NORMS (D.M.)(LAW)(CIRC.)

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NOTE: Italian laws and normatives are the legislative regulations and decrees issued by the Italian government in the form of laws, norms, decrees, circulars, and letters. These Laws and Decrees concur together with Norms and Standards in forming the governing directives for construction.

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D.L. n. 285	30/04/1992. New Road, Street and Highway Code

D.L. 360	10/9/1993. Revision of and Additional Provisions to the Street Code Regulation, approved with D.L. 30/04/1992, n. 285
D.P.R. 495	16/12/1992. Regulation for Putting into Effectthe New Road, Street and Highway Regulations

1.2 SUBMITTALS

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NOTE: Submittals must be limited to those necessary for adequate quality control. The importance of an item in the project should be one of the primary factors in determining if a submittal for the item is required.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Recommended codes for Army projects are "RE" for Resident Engineer approval, "ED" for Engineering approval, and "AE" for Architect-Engineer approval. Codes following the "G" typically are not used for Navy projects.

Submittal items not designated with a "G" are considered as being for information only for Army projects and for Contractor Quality Control approval for Navy projects.

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Submit the following in accordance with Section 01330, "Submittal Procedures."

SD-03 Product Data

Striping

Traffic signs

SD-04 Samples

Uncompacted mix

Pavement cores

SD-06 Test Reports

Trial batch reports

Mix design

Asphalt concrete

Density

Thickness

Straightedge test

Submit reports for testing specified under paragraph entitled "Field Quality Control."

SD-07 Certificates

Asphalt mix delivery record
Asphalt concrete and material sources

Obtain approval of the Contracting Officer for materials and material sources 2 days prior to the use of such material in the work.

Curbs

Guard (Guide) rails

Median barriers

Traffic signs

Submit certificates, signed by the producer, that paving materials and incidental construction items conform to specification requirements.

1.3 QUALITY ASSURANCE

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NOTE: Insert abbreviation for the regional highway department document referenced above.
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NOTE: Use words in brackets or fill in blanks with correct terminology from the referenced regional highway department document to identify specific portions of the referenced regional highway

department document.
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1.3.1 Regulatory Requirements

Provide work and materials in accordance with applicable requirements of D.P.R. 495. Materials shall also comply with CNR BU n. 139.

1.3.2 Modification of References

Where term "Director of Work" is used in CCH it shall be construed to mean [Contracting Officer] [Contractor's Quality Control representative].

1.3.3 Mix Delivery Record Data

Record and submit the following information to each load of mix delivered to the job site. Submit within one day after delivery on Government-furnished forms:

a. Truck No:

b. Time In:

c. Time Out:

d. Tonnage and Discharge Temperature:

e. Mix Type:

f. Location:

g. Stations Placed:

1.3.4 Trial Batch

Submit current bituminous design reports for all mix types proposed for use on the project.

1.3.5 Mix Design

Submit results of laboratory tests performed on each mix design. Testing shall have been accomplished not more than one year prior to date of material placement.

PART 2 PRODUCTS

2.1 SOURCE MANUFACTURERS

2.1.1 Striping Paint

The following manufacturers provide striping paint materials which comply with these specifications:

MaxMeyer.D S.p.A.

20161 Milano
Italia
Via Comasina, 121
Casella Postale 1139-20100 Milano
Tel: 02-6404.1
Fax: 02-64042363

Paulin
S. Lucia - Seren del Grappa (Belluno)
C.P. n. 73
32032 FELTRE (Belluno)
Tel: 0439/44241
Fax: 0439/448028

2.1.2 Traffic Signs

The following manufacturers provide roadway traffic signs which comply with these specifications:

S.I.S.A.S. s.r.l.
Via Sputnik, 8 - 06074 Ellera Scalo
Corciano - Perugia - Italia
Tel: 075/5171451
Fax: 0755170170

S.C.A.E. S.p.A.
Via Alessandro Volta,
6-20090 Segrate (Milano), Italia
Tel: 02-26930.1
Fax: 02-26930.310

2.1 ASPHALT CONCRETE

Provide asphalt concrete in accordance with the applicable requirements described in CCH Technical Specifications.

2.2 SUBBASE

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NOTE: Select one of the options below. Be certain that terminology used in these paragraphs is identical to that used on drawings for same item.
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[Materials for construction of the subbase shall be in accordance with CCH Part 1.] [Materials for construction of the subbase shall be in accordance with Section 02721, "[Base Course For Rigid][And Subbase Course For Flexible] Paving".] [The subbase course aggregate dimensions shall not be larger than [71 mm][____mm] and shall be in accordance with CCH Part 1 instructions.]

2.3 BASE COURSE

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NOTE: Select one of the options below. Be certain that terminology used in these paragraphs is identical to that used on drawings for same item.

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Materials shall also comply with CNR BU n. 139. [Materials for construction of the base course shall be in accordance with CCH Part 1, Article 2.] [Materials for constrution of the base course shall be in accordance with Section 02722, "Graded Crushed Aggregate Base Course For Flexible Pavement".] [The base course shall consist of aggregate processed, deposited, spread, and compacted on a prepared surface. Aggregate weight loss calculated in accordance with Los Angeles Method shall be less than or equal to [25 percent][____ percent].]

2.4 SURFACE COURSE

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NOTE: Be certain that terminology used in these paragraphs is identical to that used on drawings for same item.

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Materials for construction of the surface course shall be in accordance with CCH Part 1, Art. 2. Materials shall also comply with CNR BU n. 139.

2.5 STRIPING

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NOTE: Select the first option when the referenced regional highway department document includes paint and striping. Select the second option when the referenced regional highway department document does not include paint and striping.

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NOTE: Be certain that terminology used in these paragraphs is identical to that used on drawings for same item.

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Materials for paint striping shall be in accordance with UNI EN 1824 AND UNI EN 1436.

[Paint shall conform to D.P.R. 495.]

[2.6 CURBS [AND GUTTERS]

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NOTE: Select the first option when the referenced regional highway department document includes materials for curbs and gutters. Select the second option when the referenced regional highway department document does not include concrete

materials for curbs and gutters and include Section 03300, "Cast-In-Place Concrete" in the project specification, as appropriate.

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NOTE: Be certain that terminology used in these paragraphs is identical to that used on drawings for same item.

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Materials for construction of curbs [and gutters] shall be in accordance with CCH Part 1, Art. 16.

[Concrete is specified in Section 03300, "Cast-In-Place Concrete."]

]2.7 GUARD (GUIDE) RAILS

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NOTE: Be certain that terminology used in these paragraphs is identical to that used on drawings for same item.

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Materials for construction of the guard (guide) rails shall be in accordance with D.P.R. 495. Guard (Guide) Rails shall also comply with the requirements specified in UNI EN 1317-1 and UNI EN 1317-2.

2.8 MEDIAN BARRIERS

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NOTE: Be certain that terminology used in these paragraphs is identical to that used on drawings for same item.

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Materials for construction of the median barriers shall be in accordance with D.P.R. 495 and D.L. 360.

2.9 TRAFFIC SIGNS

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NOTE: Be certain that terminology used in these paragraphs is identical to that used on drawings for same item.

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Provide traffic signs in accordance with D.P.R. 495 and D.L. 360.

[2.10 PRECAST CAR STOPS

Provide car stops to the profile and size indicated. [Manufacture with air entrained concrete having a minimum compressive strength of 25 MPa at 28 days, with two No. 4 reinforcing rods located at mid-point of its cross

section and with two galvanized sleeves for anchoring.][Manufacture with 100 percent recycled content level of plastic or rubber in accordance with D.L. 360].

]2.11 COMPOSITION OF MIXTURE REQUIREMENTS

2.11.1 Mixture Properties

Gradation of mineral aggregate shall be as specified. Percentage of bituminous material provided in the bituminous mixtures shall be within the limits specified. Mixtures shall have the following physical properties:

Test Property	Values
Stability (50 Blows)	Not less than 454 kg
Flow (0.25 mm)	Not more than 20 nor less than 8
Percent Air Voids	Not less than 3 nor more than 8 for binder course; not less than 3 nor more than 5 for wearing course
Percent Voids in Mineral Aggregates	See Table I

TABLE I

MINIMUM PERCENT VOIDS IN MINERAL AGGREGATE (VMA)

CCH Standard Sieve Designation	Nominal Maximum Aggregate Size, mm*	Minimum VMA Percent
5 mm	5	18
10 mm	10	16
15 mm	15	15
25 mm	25	13
40 mm	40	12.1
50 mm	50	11.5

*NOTE: The nominal maximum aggregate size is the next larger sieve than the sieve on which at least 10 percent of the total aggregate is retained.

2.11.2 Quantity of Bituminous Material

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NOTE: If slag or any unusually porous aggregate is anticipated for possible use in the mix, the maximum asphalt cement percentages indicated may need to be increased. Check requirements of local materials and modify percentages as necessary.

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Mix asphalt cement with aggregates of corresponding mixes in the following proportions:

ASPHALT CEMENT PERCENT BY WEIGHT OF TOTAL MIX	
Binder Course	Wearing Course
4 to 8	5 to 9

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Excavation and Filling

Excavation and filling to establish elevation of subgrade is specified in Section 02315, "Excavation and Fill."

3.2 CONSTRUCTION

Provide construction in accordance with the applicable requirements of the D.P.R. 495, except where indicated or specified otherwise.

3.2.1 Subgrade

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NOTE: Be certain that terminology used in these paragraphs is identical to that used on drawings for same item.
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Preparation of subgrade shall be in accordance with CCH Part 1, Art. 36.

3.2.2 Subbase

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NOTE: Be certain that terminology used in these paragraphs is identical to that used on drawings for same item.
****

Methods of construction of the subbase shall be in accordance with [CCH Part 1, Art. 37] [Section 02721, "[Base Course For Rigid][And Subbase Course For Flexible] Paving"].

3.2.3 Base Course

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NOTE: Be certain that terminology used in these paragraphs is identical to that used on drawings for same item.
****

Methods of construction of the base course shall be in accordance with [CCH Part 1, Art. 38] [Section 02722, "Graded Crushed Aggregate Basse Course For Flexible Pavement"].

3.2.4 Surface Course

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NOTE: Be certain that terminology used in these paragraphs is identical to that used on drawings for same item.
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Methods of construction of the surface course shall be in accordance with CCH Part 1, Art. 38.2. Placement will not be permitted unless the Contractor has a working asphalt thermometer on site.

3.2.5 Striping

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NOTE: Include the bracketed portion (first sentence) when the referenced regional highway department document includes paint and striping.
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NOTE: Use words in brackets or fill in blanks with correct terminology and insert appropriate numbers from referenced regional highway department document. Be certain that terminology used in these paragraphs is identical to that used on drawings for same item.
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Provide paint striping in accordance with D.P.R. 495. Allow bituminous pavement to cure for at least 21 days before paint is applied. Pavement shall be thoroughly clean and entirely free of loose sand, stones, dust, oil, grease, water, and other substances that will be deleterious to the paint or will adversely affect the adhesion of the paint. Do not apply paint during high wind (over 24 km/h) or high humidity (over 70 percent). Apply paint only when ambient temperature is 5 degrees C or above and rising but not more than 35 degrees C. Dimensions and arrangement of striping shall be as indicated. Apply paint to a wet film thickness of 0.38 mm by means of conventional traffic line striping equipment. Traffic shall not be permitted to use the painted areas for a minimum of 30 minutes after painting of lines has been completed.

[3.2.6 Curbs [and Gutters]

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NOTE: Select the first option when the referenced regional highway department document includes materials for curbs and gutters. Select the second option when the referenced regional highway department document does not include concrete materials for curbs and gutters and include Section 03300, "Cast-In-Place Concrete" in the project specification, as appropriate.

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NOTE: Use words in brackets or fill in blanks with correct terminology and insert appropriate numbers from referenced regional highway department document. Be certain that terminology used in these paragraphs is identical to that used on drawings for same item.

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Methods of construction of curbs [and gutters] shall be in accordance with CCH Part 1, Art. 46.

[Provide curbs [and gutters] as indicated. Provide concrete construction as specified in Section 03300, "Cast-In-Place Concrete."]

]3.2.7 Guard (Guide) Rails

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NOTE: Be certain that terminology used in these paragraphs is identical to that used on drawings for same item.

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Methods of construction of the guard (guide) rails shall be in accordance with D.P.R. 495, UNI EN 1317-1 and UNI EN 1317-2.

3.2.8 Median Barrier

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NOTE: Be certain that terminology used in these paragraphs is identical to that used on drawings for same item.

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Methods of construction of the median barriers shall be in accordance with D.P.R. 495, UNI EN 1317-1 and UNI EN 1317-2.

3.2.9 Traffic Signs

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NOTE: Be certain that terminology used in these paragraphs is identical to that used on drawings for same item.

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Install traffic signs in accordance with D.P.R. 495.

[3.2.10 Precast Car Stops

Provide car stops where indicated. Install with an anchor rod driven through each sleeve.

]3.3 FIELD QUALITY CONTROL

Sample shall be taken by Contractor as specified herein. Contractor shall replace pavement where sample cores have been removed. Submit [2] [_____] pavement cores when using the in-place nuclear density method.

3.3.1 Sample and Core Identification

Place each sample and core in a container and securely seal to prevent loss of material. Tag each sample for identification. Tag shall contain the following information:

a. Contract No.

b. Sample No.

c. Quantity

d. Date of Sample

e. Sample Description

f. Source/Location/Stations Placed/depth below the finish grade

g. Intended Use

h. Thicknesses of various lifts placed

3.3.2 Testing

3.3.2.1 Bituminous Mix Testing

Take two samples per day per mix type at plant or from truck. Test uncompacted mix for extraction in accordance with CNR BU 38 and sieve analysis in accordance with CNR BU 39, CNR BU 65 and CNR BU 76. Test samples for stability and flow in accordance with CNR BU 30. When two consecutive tests fail to meet requirements of specifications, cease placement operations and test a new trial batch prior to resumption of placement operations. Submit [2] [_____] per day of each mix type. When two tests on uncompacted mix fail submit new trial batch for approval.

3.3.2.2 Testing of Pavement Course

a. Density: Determine density of pavement by testing cores obtained from the binder and wearing course in accordance with CNR BU 76. Take three cores at location designated by Contracting Officer for each [18 metric tons][_____], or fraction thereof, of asphalt placed. Deliver cores undisturbed and undamaged to laboratory and provide test results within [48] [_____] hours of each day placement of paving materials.

b. Thickness: Determine thickness of the binder and wearing course from cores taken for density test.

c. Straightedge Test: Test compacted surface of binder course and wearing course with a straightedge as work progresses. Apply straightedge parallel with and at right angles to center line after final rolling. Variations in the binder course surface shall not be more than 6 [13] [3] mm from the lower edge of the 3.0 m straightedge; variations in wearing course surface shall not be more than 6 [13] [3] mm from the lower edge of the 3.0 m straightedge. Pavement showing irregularities greater than that specified shall be corrected as directed by Contracting Officer.

3.3.3 Striping Quality Control and Testing

Before application of striping paint, the Contractor shall provide quality plan for material application in accordance with UNI ENV 13459-2. Performance in use of striping shall be checked in accordance with UNI ENV 13459-3. Striping testing on site shall be also carried out in compliance with UNI EN 1824.

-- End of Section --